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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/552,989	02/05/2007	Kohei Nagayama	00684.109158.	2484

5514 7590 01/21/2010

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EXAMINER	
BRAY, STEPHEN A	
ART UNIT	PAPER NUMBER
2629	

MAIL DATE	DELIVERY MODE
01/21/2010	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/552,989	NAGAYAMA, KOHEI	
	Examiner	Art Unit	
	STEPHEN A. BRAY	2629	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *23 October 2009*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-14* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-3 and 5-14* is/are rejected.

7)☒ Claim(s) *4* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *23 October 2009* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *7/23/2009*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

In an amendment dated, 10/23/2009, the Applicant amended claims 3-4, 10, 12, and 14. Currently claims 1-14 are pending.

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

2. Claims 1-3, 5, 12 are rejected under 35 U.S.C. 103(a) as being unpatentable over Endo (WO 2004/044647) in view of Togano et al (WO 2004/095122).

Regarding claim 1, *Endo* discloses an electrophoretic display device (Figure 1), comprising:

a substrate (Figure 1 discloses a substrate 1.),

a partition wall disposed on a surface of the substrate (Figure 1 discloses partition wall 7.),

a liquid layer, disposed in a container defined by the substrate and the partition wall, comprising electrophoretic particles and a dispersion medium (Figure 1 discloses electrophoretic particles 6 and dispersion medium 5 disposed in the container.),

a first electrode formed at a position apart from the partition wall on the substrate (Figure 1 discloses a first electrode 3 disposed in the center of the display cell.),

a second electrode formed along the partition wall (Page 10, lines 7-10 discloses that the second electrode 4 can be provided on the surface of partition wall 7.), and

means for applying a voltage between the first electrode and the second electrode (Page 15, lines 7-15 of the specification discloses applying a voltage between the first and second electrodes. Therefore it is inherent that there is a means for applying a voltage connected to the first and second electrodes.),

and the electrophoretic particles in the container are moved between a surface of the partition wall and a surface of the resistance layer to effect display (Figure 1 discloses that electrophoretic particles 6 move between the partition wall 6 and the scattering layers 8 and 9.).

Endo fails to teach wherein at the surface of the substrate defining the container, a resistance layer electrically connecting the first electrode and the second electrode is formed.

Togano et al discloses wherein at the surface of the substrate defining the container, a resistance layer electrically connecting the first electrode and the second electrode is formed (Figure 1 and Page 24, lines 16-19 disclose having an insulating layer 11 disposed on substrate 1 which covers and electrically connects the first electrode group 3 and second electrode group 4. It is well known in the art that electrically insulating materials are highly resistive. Therefore the insulating film 11 can be considered to be a resistance layer which has a high resistance value.).

Therefore it would have been obvious to one of ordinary skill in the art at the time that the invention was made to modify the electrophoretic display taught by *Endo* with

the teachings of *Togano et al* in order to form an electrophoretic display device in which greater control over adsorption forces between the electrodes and the electrophoretic particles is obtained.

Regarding claim 2, *Endo* as modified above discloses a device according to claim 1, wherein the first electrode and the resistance layer are electrically connected at a position most distant from the second electrode on the substrate (Figures 1 and 4 of *Endo* discloses that electrode 3 is disposed in the center of the display cell.).

Regarding claim 3, *Endo* as modified above discloses a device according to claim 1 or 2, wherein the resistance layer is formed to cover the partition wall (Figure 1 of *Togano et al* discloses that insulating layer 11 is formed such that it covers the partition wall 6.).

Regarding claim 5, *Endo* as modified above discloses a device according to claim 1, wherein the resistance layer is formed of a transparent material, and a light reflection layer is disposed opposite to the liquid layer through the resistance layer (Figure 1 and Page 24, lines 16-19 of *Togano et al* discloses that insulating layer 11 is formed of a transparent material and that a scattering layer 10 is disposed below the insulating layer 11 to reflect the light transmitted through insulating layer 11.).

Regarding claim 12, *Endo* as modified above discloses a driving method of an electrophoretic display apparatus of the type wherein the apparatus comprises:

a substrate (Figure 1 of *Endo* discloses a substrate 1.);

a partition wall disposed on a surface of the substrate (Figure 1 of *Endo* discloses partition wall 7.);

a liquid layer, disposed in a container defined by the substrate and the partition wall, comprising electrophoretic particles and a dispersion medium (Figure 1 of *Endo* discloses electrophoretic particles 6 and dispersion medium 5 disposed in the container.);

a first electrode formed at a position apart from the partition wall on the substrate (Figure 1 of *Endo* discloses a first electrode 3 disposed in the center of the display cell.);

a second electrode formed along the partition wall (Page 10, lines 7-10 of *Endo* discloses that the second electrode 4 can be provided on the surface of partition wall 7.), and

a resistance layer for electrically connecting the first electrode and the second electrode is formed at the surface of substrate defining container (Figure 1 and Page 24, lines 16-19 of *Togano et al* disclose having an insulating layer 11 disposed on substrate 1 which covers and electrically connects the first electrode group 3 and second electrode group 4. It is well known in the art that electrically insulating materials are highly resistive. Therefore the insulating film 11 can be considered to be a resistance layer which has a high resistance value.);

the driving method comprising:

applying a voltage of one polarity between the first and second electrodes to move the electrophoretic particles to a surface of the partition wall (Page 15, lines 7-15 in the specification of *Endo* discloses applying +50 volts to first electrodes 3 and -50

volts to second electrodes 4 to generate a white display, i.e. move the particles as shown in Figure 1 (a).), and

applying a voltage of the other polarity between the first and second electrodes to move the electrophoretic particles to a surface of the resistance layer (Page 15, lines 7-15 in the specification of *Endo* discloses applying -50 volts to first electrodes 3 and +5 volts to second electrodes 4 to generate a black display, i.e. move the particles as shown in Figure 1 (b).).

3. Claim 6 is rejected under 35 U.S.C. 103(a) as being unpatentable over Endo in view of Togano et al as applied to claim 1 above, and further in view of Uno et al (US 6,727,883).

Regarding claim 6, *Endo* as modified above discloses a device according to claim 5.

Endo as modified above fails to teach wherein between the resistance layer and the light reflection layer, a coloring layer formed of an insulating material is disposed.

Uno et al discloses wherein between the resistance layer and the light reflection layer, a coloring layer formed of an insulating material is disposed (Figure 1 and Column 12, lines 35-47 disclose that colored layers 8a and 8b are formed between insulating layer 9 and first substrate 1a.).

Therefore it would have been obvious to one of ordinary skill in the art at the time that the invention was made to further modify the electrophoretic device taught by *Endo*

with the teachings of *Uno et al* in order to form a display device in which colored images can be created without requiring the electrophoretic particles to be colored.

4. Claim 7 is rejected under 35 U.S.C. 103(a) as being unpatentable over Endo in view of Togano et al as applied to claim 1 above, and further in view of Ikeda et al (US 6,741,385).

Regarding claim 7, *Endo* as modified above discloses a device according to claim 1.

Endo as modified above fails to teach wherein the first electrode is extendedly formed opposite to the liquid layer through the resistance layer and an insulating layer.

Ikeda et al discloses wherein the first electrode is extendedly formed opposite to the liquid layer through the resistance layer and an insulating layer (Figure 3 discloses electrodes 5a and 5c which are formed through insulating layers 4 and 9, of which layer 9 could be called a resistive layer with very high resistance.).

Therefore it would have been obvious to one of ordinary skill in the art at the time that the invention was made to further modify the electrophoretic device taught by *Endo* with the teachings of *Ikeda et al* in order to form a display device with higher display contrast.

5. Claims 8-9, 14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Endo in view of Togano et al as applied to claim 1 above, and further in view of Goden (US 2004/0184136).

Regarding claim 8, *Endo* as modified above discloses an electrophoretic display apparatus, comprising:

a substrate (Figure 1 of *Endo* discloses a substrate 1.),

a partition wall disposed on a surface of the substrate (Figure 1 of *Endo* discloses partition wall 7.),

a liquid layer, disposed in a container defined by the substrate and the partition wall, comprising electrophoretic particles and a dispersion medium (Figure 1 of *Endo* discloses electrophoretic particles 6 and dispersion medium 5 disposed in the container.),

a first electrode formed at a position apart from the partition wall on the substrate (Figure 1 of *Endo* discloses a first electrode 3 disposed in the center of the display cell.),

a second electrode formed along the partition wall (Page 10, lines 7-10 of *Endo* discloses that the second electrode 4 can be provided on the surface of partition wall 7.),

wherein at the surface of the substrate defining the container, a resistance layer for electrically connecting the first electrode and the second electrode is formed, and the electrophoretic particles in the container are moved between a surface of the partition wall and a surface of the resistance layer (Figure 1 and Page 24, lines 16-19 of *Togano et al* disclose having an insulating layer 11 disposed on substrate 1 which covers and electrically connects the first electrode group 3 and second electrode group 4. It is well known in the art that electrically insulating materials are highly resistive. Therefore the insulating film 11 can be considered to be a resistance layer which has a high

resistance value. Figure 1 of *Endo* also discloses that electrophoretic particles 6 move between the partition wall 6 and the scattering layers 8 and 9.)).

Endo as modified above fails to teach a plurality of data lines disposed on the substrate at a certain pitch,

a plurality of scanning lines and a plurality of constant-voltage lines, the scanning lines and the constant-voltage lines being disposed on the substrate at a certain pitch while intersecting with the plurality of data lines, and

a switching device and a capacitor which are disposed at each of the intersections of the data lines and the scanning lines, the capacitor holding a voltage depending on display data by supplying a sequential scanning signal to the scanning lines and supplying a data signal to the data lines and depending on the voltage held by the capacitor, a voltage or a current being applied between the first and second electrodes so as to move the electrophoretic particles to effect display,

Goden discloses a plurality of data lines disposed on the substrate at a certain pitch (Figure 5 discloses a plurality of data lines 13.),

a plurality of scanning lines and a plurality of constant-voltage lines, the scanning lines and the constant-voltage lines being disposed on the substrate at a certain pitch while intersecting with the plurality of data lines (Figure 5 discloses a plurality of scanning lines 12 and a plurality of constant voltage lines attached to one end of capacitor 11, both lines which intersect with the plurality of data lines 13.), and

a switching device and a capacitor which are disposed at each of the intersections of the data lines and the scanning lines, the capacitor holding a voltage depending on display data by supplying a sequential scanning signal to the scanning lines and supplying a data signal to the data lines and depending on the voltage held by the capacitor, a voltage or a current being applied between the first and second electrodes so as to move the electrophoretic particles to effect display (Figure 5 discloses switching device 10 and capacitor 11, where the capacitor holds charge supplied by data line 13. Figures 3(a) -3(c) and paragraphs [0089] - [0095] disclose that the voltage applied between the electrodes is based on the display pattern that is desired.),

Therefore it would have been obvious to one of ordinary skill in the art at the time that the invention was made to further modify the electrophoretic display taught by *Endo* with the teachings of *Goden* in order to form a display device in which changes in the display gradation level are reduced, thus improving the image quality of the display.

Regarding claim 9, *Endo* as modified above discloses an apparatus according to claim 8, wherein one of terminals of the capacitor is connected with the first electrode, and a time constant defined by a product of an electric resistance between the first and second electrodes and a capacitance of the capacitor is longer than a one-field period in sequential scanning of the scanning lines (Paragraph [0081] of *Goden* discloses capacitor 11 is connected to the first electrode 4 and Figure 22 discloses that

the time constant for the display is longer than the one-field period since there is almost no voltage decay during the one-field periods shown on the graph.).

Regarding claim 14, *Endo* as modified above discloses a driving method of an electrophoretic display apparatus of the type wherein the apparatus comprises:

a substrate (Figure 1 of *Endo* discloses a substrate 1.);

a partition wall disposed on a surface of the substrate (Figure 1 of *Endo* discloses partition wall 7.);

a liquid layer, disposed in a container defined by the substrate and the partition wall, comprising electrophoretic particles and a dispersion medium (Figure 1 of *Endo* discloses electrophoretic particles 6 and dispersion medium 5 disposed in the container.);

a first electrode formed at a position apart from the partition wall on the substrate (Figure 1 of *Endo* discloses a first electrode 3 disposed in the center of the display cell.);

a second electrode formed along the partition wall (Page 10, lines 7-10 of *Endo* discloses that the second electrode 4 can be provided on the surface of partition wall 7.), and

a resistance layer for electrically connecting the first electrode and the second electrode is formed at the surface of substrate defining container (Figure 1 and Page 24, lines 16-19 of *Togano et al* disclose having an insulating layer 11 disposed on substrate 1 which covers and electrically connects the first electrode group 3 and second electrode group 4. It is well known in the art that electrically insulating materials

are highly resistive. Therefore the insulating film 11 can be considered to be a resistance layer which has a high resistance value.);

a plurality of data lines disposed on the substrate at a certain pitch (Figure 5 of *Goden* discloses a plurality of data lines 13.);

a plurality of scanning lines and a plurality of constant-voltage lines, the scanning lines and the constant-voltage lines being disposed on the substrate at a certain pitch while intersecting with the plurality of data lines (Figure 5 of *Goden* discloses a plurality of scanning lines 12 and a plurality of constant voltage lines attached to one end of capacitor 11, both lines which intersect with the plurality of data lines 13.); and

a switching device and a capacitor which are disposed at each of the intersections of the data lines and the scanning lines, the capacitor holding a voltage depending on display data by supplying a sequential scanning signal to the scanning lines and supplying a data signal to the data lines and depending on the voltage held by the capacitor, a voltage or a current being applied between the first and second electrodes so as to move the electrophoretic particles to effect display (Figure 5 of *Goden* discloses switching device 10 and capacitor 11, where the capacitor holds charge supplied by data line 13. Figures 3(a) -3(c) and paragraphs [0089] - [0095] disclose that the voltage applied between the electrodes to move the electrophoretic particles is based on the display pattern that is desired.);

the driving method comprising:

sequentially scanning the scanning lines to apply a voltage of one polarity between the first and second electrodes to move the electrophoretic particles to a

surface of the partition wall (Figure 14(a) and paragraph [0124] of *Goden* discloses applying a voltage Va to the first electrode 4 and a voltage Vcom to the second electrode 5 and a voltage Vc to the third electrode 6 to move the electrophoretic particles to the partition wall 7.), and

sequentially scanning the scanning lines to apply a voltage of the other polarity between the first and second electrodes to move the electrophoretic particles to a surface of the resistance layer (Figure 14(b) and paragraph [0124] of *Goden* discloses applying a voltage Vb to the first electrode 4 and a voltage Vcom to the second electrode 5 and a voltage Vc to the third electrode 6 to move the electrophoretic particles to collect along the bottom of the display cell.).

6. Claims 10-11 are rejected under 35 U.S.C. 103(a) as being unpatentable over Endo in view of Togano et al, further in view of Goden as applied to claim 8 above, and further in view of Asano et al (US 2004/0070557).

Regarding claim 10, *Endo* as modified above discloses an apparatus according to claim 8.

Endo as modified above fails to teach the apparatus further comprises a drive voltage line, disposed at the surface of the substrate, electrically connected with the first electrode, and means for controlling a current flowing between terminals of the connected drive voltage line and the first electrode depending on the voltage held by the capacitor.

Asano et al discloses the apparatus further comprises a drive voltage line, disposed at the surface of the substrate, electrically connected with the first electrode, and means for controlling a current flowing between terminals of the connected drive voltage line and the first electrode depending on the voltage held by the capacitor (*Asano et al* discloses in Figure 12 an active matrix driving means in which there is a transistor 112 connected to voltage VCC1 with a capacitor 113 connected between voltage VCC1 and the gate of transistor 22. When transistor 111 is on, the data voltage is stored in capacitor 113. When transistor 111 is turned off, the data voltage stored in capacitor 113 is used to control the current flowing through transistor 112. Even though the display element being driven is electroluminescent, the same principles can be applied to other active matrix display devices.).

Therefore it would have been obvious to one of ordinary skill in the art at the time that the invention was made to further modify the electrophoretic display taught by *Endo* et al with the teachings of *Asano et al* in order to create an active matrix electrophoretic display in which irregularities in the manufacture of the controlling transistors can be accounted for.

Regarding claim 11, *Endo* as modified above discloses an apparatus according to claim 10.

Endo as modified above fails to teach wherein the apparatus further comprises means for compensating a fluctuation in current flowing between the terminals (Figure 2 and the abstract of *Asano et al* discloses an active matrix driving circuit which can

accurately compensate each pixel for threshold voltage irregularities, thus preventing fluctuations in the drive current provided by drive transistor 22.).

7. Claim 13 is rejected under 35 U.S.C. 103(a) as being unpatentable over Endo (WO 2004/044647) and Togano et al (WO 2004/095122) as applied to claim 12 above, and further in view of Ikeda (US 6,239,896).

Regarding claim 13, *Endo* as modified above discloses a method according to claim 12.

Endo as modified above fails to teach wherein after the electrophoretic particles are moved on the surface of the partition wall or the surface of the resistance layer, a period during which the voltage between the first and second electrodes is substantially zero is provided.

Ikeda discloses wherein after the electrophoretic particles are moved on the surface of the partition wall or the surface of the resistance layer, a period during which the voltage between the first and second electrodes is substantially zero is provided (Figures 7A, 7B, and 7CA - 7CD and Column 12, lines 52-60 disclose that in time period T5, after the display has been rewritten in time periods T1-T4, a ground voltage equal to zero is applied to each of the electrodes).

Therefore it would have been obvious to one of ordinary skill in the art at the time that the invention was made to further modify the electrophoretic display taught by *Endo* et al with the teachings of *Ikeda* in order to create an electrophoretic display which has a threshold characteristic and a memory characteristic.

Allowable Subject Matter

8. Claim 4 is objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to STEPHEN A. BRAY whose telephone number is (571)270-7124. The examiner can normally be reached on Monday - Friday, 9:00 a.m. - 5:00 p.m., EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, AMR AWAD can be reached on (571)272-7764. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/STEPHEN A BRAY/
Examiner, Art Unit 2629

/Amr Awad/
Supervisory Patent Examiner, Art Unit 2629

16 January 2010